4.6 GREENHOUSE GAS EMISSIONS

This section provides an evaluation of potential greenhouse gas (GHG) emission impacts associated with the proposed project. The *Air Quality and Climate Change Technical Report* prepared by HELIX (2012a) is provided in Appendix B.

4.6.1 Environmental Setting

Greenhouse Gas Background

Global climate change refers to changes in average climatic conditions on Earth, as a whole, including temperature, wind patterns, precipitation and storms. Global temperatures are moderated by naturally occurring atmospheric gases that are commonly referred to as "greenhouse gases" because they function like a greenhouse by letting light in but preventing heat from escaping. Naturally occurring GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These gases allow solar radiation (sunlight) into the Earth's atmosphere, but prevent heat from escaping, thus warming the Earth's atmosphere. The natural accumulation of GHGs in the atmosphere has a positive effect on the Earth's temperature. Without these natural GHGs, the Earth's temperature would be about 61ºF cooler (California Environmental Protection Agency 2006).

In addition to the naturally occurring gases, man-made compounds also act as GHGs; common examples include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). These compounds are the result of a number of activities including vehicular use, energy consumption/production, manufacturing and cattle farming. These man-made compounds increase the natural concentration of GHGs in the atmosphere and are commonly believed to result in a phenomenon referred to as "global warming" or "global climate change."

Greenhouse Gas Regulations

Concern about the disproportionately negative impacts that global warming are expected to have on the California environment and economy has led the California State Legislature to pass several climate-change-related bills. These bills are aimed at controlling and reducing the emission of GHGs to slow the effects of global warming. The bills that have the potential to substantially impact the proposed project are discussed in this section. In addition to the bills discussed below, the California Legislature has introduced numerous other bills that range in

scope from establishing market-based compliance mechanisms to energy standards for light bulbs. Some have been enacted into law and others are pending.

California Code of Regulations, Title 24, Part 6

Although not originally intended to reduce GHGs, California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24) were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The GHG emission inventory was based on Title 24 standards as of October 2005; however, Title 24 has been updated as of 2008 and standards were phased in as of January 2010. The latest Title 24 standards are anticipated to increase energy efficiency by 15 percent, thereby reducing GHG emissions from energy use by 15 percent. Energy-efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for water heating) results in GHG emissions. Therefore, increased energy efficiency results in decreased GHG emissions.

Executive Order D-16-00

This Executive Order (EO), signed by Governor Gray Davis on August 2, 2000, established a state sustainable building goal. The sustainable building goal is to site, design, deconstruct, construct, renovate, operate, and maintain state buildings that are models of energy, water, and materials efficiency, while providing healthy, productive, and comfortable indoor environments and long-term benefits to Californians. As with the California Energy Code, reductions in energy usage provided by sustainable building design would result in reduced GHG emissions.

Senate Bill 1771

Senate Bill (SB) 1771 (Sher), enacted on September 30, 2000, requires the Secretary of the Resources Agency to establish a nonprofit public benefit corporation, to be known as the "California Climate Action Registry" (CCAR), for the purpose of administering a voluntary GHG emission registry. The State Energy Resources Conservation and Development Commission (commonly called the California Energy Commission [CEC]) is required to develop metrics for use by the CCAR and update the state's inventory of GHG emissions by January 1, 2002, and every five years thereafter.

Executive Order S-7-04

EO S-7-04, signed by Governor Arnold Schwarzenegger on April 20, 2004, designated California's 21 interstate freeways as the "California Hydrogen Highway Network" and directed CalEPA and all other relevant state agencies to:

> …plan and build a network of hydrogen fueling stations along these roadways and in urban centers that they connect, so that by 2010, every Californian will have access to hydrogen fuel, with a significant and increasing percentage from clean, renewable sources.

The EO also directs the CalEPA, in concert with State Legislature, and in consultation with the CEC and other relevant state and local agencies to develop the California Hydrogen Economy Blueprint Plan "for the rapid transition to a hydrogen economy in California" by January 1, 2005. The blueprint plan is to be updated biannually. Recommendations to the Governor and State Legislature are to include, among others:

> Promoting environmental benefits (including global climate change) and economic development opportunities resulting from increased utilization of hydrogen for stationary and mobile applications; policy strategies to ensure hydrogen generation results in the lowest possible emissions of GHG and other air pollutants.

Executive Order S-3-05

EO S-3-05, signed by Governor Schwarzenegger on June 1, 2005, calls for a reduction in GHG emissions to year 1990 levels by the year 2020, and for an 80 percent reduction in GHG emissions by the year 2050. EO S-3-05 also calls for the CalEPA to prepare biennial science reports on the potential impact of continued global warming on certain sectors of the California economy. The first of these reports, "Scenarios of Climate Change in California: An Overview," was published in February 2006. The report uses a range of emissions scenarios developed by the United Nations Intergovernmental Panel on Climate Change (IPCC) to project a series of potential warming ranges (i.e., temperature increases) that may occur in California during the 21st century: lower warming range (3.0 - 5.5°F); medium warming range (5.5 - 8.0°F); and higher warming range (8.0 - 10.5°F). The report then presents analysis of future climate in California under each warming range.

As shown above, each emissions scenario would result in substantial temperature increases for California. According to the report, substantial temperature increases would result in a variety of impacts to the people, economy, and environment of California associated with a projected increase in extreme conditions. The severity of the impacts would depend upon actual future emissions of GHGs and associated warming. Under the report's emissions scenarios, the impacts of global warming in California are anticipated to include, but are not limited to, public health, biology, rising sea levels, hydrology and water quality, and water supply.

Assembly Bill 32 – Global Warming Solution Act of 2006

The California Global Warming Solutions Act of 2006, widely known as AB 32, requires the CARB to develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is directed to set a GHG emission limit, based on 1990 levels, to be achieved by 2020. The bill sets a timeline for adopting a scoping plan for achieving GHG reductions in a technologically and economically feasible manner.

The heart of the bill is the requirement that statewide GHG emissions must be reduced to 1990 levels by the year 2020. California needs to reduce GHG emissions by approximately 28.3 percent below the "business-as-usual" predictions to achieve this goal. The bill requires the CARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG reductions. Key AB 32 milestones are as follows:

- June 30, 2007 – Identification of discrete early action GHG emissions reduction measures. On June 21, 2007, CARB satisfied this requirement by approving three early action measures. These were later supplemented by adding six other discrete early action measures.

- January 1, 2008 – Identification of the 1990 baseline GHG emissions level and approval of a statewide limit equivalent to that level. Adoption of reporting and verification requirements concerning GHG emissions. On December 6, 2007, the CARB approved a statewide limit on GHG emissions levels for the year 2020 consistent with the determined 1990 baseline.

- January 1, 2009 – Adoption of a Scoping Plan for achieving GHG emission reductions. On October 15, 2008, the CARB issued a "discussion draft" Scoping Plan entitled "Climate Change Draft Scoping Plan: A Framework for Change" (Draft Scoping Plan). The CARB adopted the Draft Scoping Plan at its December 11, 2008, meeting.

- January 1, 2010 – Adoption and enforcement of regulations to implement the discrete early action measures. On April 2009, CARB adopted low carbon fuel standards. On September 2009, CPUC adopted energy efficiency programs and CARB adopted the clean vehicle standards. On November 2009, CEC adopted the television energy efficiency standards.

- January 1, 2011 – Adoption of GHG emissions limits and reduction measures by regulation. On September 2010, CARB established regional GHG targets under Senate Bill (SB) 375.

- January 1, 2012 – GHG emissions limits and reduction measures adopted in 2011 become enforceable. On March 2011, California Legislature passed the 33-percent renewable portfolio standards for both public and investor-owned utilities. On October 2011, CARB adopted the final cap and trade regulation.

As of October 31, 2011, 18 of 30 CARB regulations had been approved, including all nine discrete early actions, as required by AB 32. The current estimate for the necessary GHG emissions reductions to attain the goals of AB 32 (i.e., 1990 levels by 2020) is 174 million metric tons (MMT) of CO_2 equivalent[1] (CO_2e). It is estimated that the nine proposed discrete early actions will provide approximately 16 MMT CO_2e of GHG reductions while the other early actions will provide approximately 26 MMT CO_2e of GHG reductions. It also is anticipated that an additional 30 MMT CO_2e in reductions will be achieved from the passage of anti-idling measures and AB 1493 (described below). The remaining 102 MMT CO_2e are expected to be achieved through CARB's Scoping Plan and other emission reduction efforts by members of the Climate Action Team (CAT). By January 1, 2014, and every five years thereafter, the CARB will update its Scoping Plan.

Assembly Bill 1493 – Vehicular Emissions of Greenhouse Gases

In response to the transportation sector accounting for more than half of California's CO_2 emissions, AB 1493 (Pavley) was enacted on July 22, 2002. AB 1493 requires the CARB to set GHG emission standards for passenger vehicles, light-duty trucks, and other vehicles determined to be vehicles whose primary use is noncommercial personal transportation in the

[1] The effect each GHG has on climate change is measured as a combination of the volume of its emissions, and its global warming potential. The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere, and is expressed as a function of how much warming would be caused by the same mass of CO_2. For instance, CH_4 has a global warming potential of 21, meaning that one gram of CH_4 traps the same amount of heat as 21 grams of CO_2.

state manufactured in year 2009 or later. In setting these standards, the CARB considered cost effectiveness, technological feasibility, and economic impacts. The CARB adopted the standards in September 2004. When fully phased in, the near-term (years 2009 to 2012) standards would result in a reduction of approximately 22 percent in GHG emissions compared to the emissions from the year 2002 fleet, while the midterm (years 2013 to 2016) standards would result in a reduction of approximately 30 percent. Some currently used technologies that achieve GHG reductions include small engines with superchargers, continuously variable transmissions and hybrid electric drives. To set its own GHG emissions limits on motor vehicles, California had to receive a waiver from the EPA. The EPA approved the waiver in June 2009.

Assembly Bill 75

AB 75 was passed in 1999 and mandates state agencies to develop and implement an integrated waste management plan to reduce GHG emissions related to solid waste disposal. In addition, the bill mandates that community service districts providing solid waste services report the disposal and diversion information to the appropriate city, county or regional jurisdiction. Since 2004, the bill requires diversion of at least 50 percent of the solid waste from landfills and transformation facilities, and submission to the California Department of Resources Recycling and Recovery (formerly known as California Integrated Waste Management Board) of an annual report describing the diversion rates.

Senate Bill 1368

In 2006, the California Legislature passed SB 1368, which requires the Public Utilities Commission (PUC) to develop and adopt a "GHGs emission performance standard" by February 1, 2007, for the private electric utilities under its regulation. The PUC adopted an interim standard on January 25, 2007, but has formally requested a delay for the local publicly owned electric utilities under its regulation. These standards apply to all long-term financial commitments entered into by electric utilities. The CEC was required to adopt a consistent standard by June 30, 2007. However, this date was missed, and the CEC will address the concerns of the Office of Administrative Law (OAL) and resubmit the rulemaking. The rulemaking then must be approved by the OAL before it can take effect. As of this writing, CEC has postponed this required rulemaking process indefinitely.

In the meantime, the PUC and CEC adopted a preferred loading order to meet goals for satisfying the state's growing demand for electricity while reducing GHG emissions. The preferred loading order places top priority on first increasing energy efficiency and demand

response, then providing new generation from renewable and distributed generation resources, and, lastly, providing clean fossil-fueled generation and infrastructure improvements.

Senate Bill 1505

Largely in response to EO S-7-04, SB 1505 was passed by the legislature and signed by Governor Schwarzenegger on September 30, 2006. This bill requires the CARB to adopt regulations by July 1, 2008 that ensure that the production and use of hydrogen for transportation purposes contributes to the reduction of GHG emissions, criteria air pollutants and TACs.

Executive Order S-01-07

This EO, signed by Governor Schwarzenegger on January 18, 2007, directs that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by the year 2020. It orders that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California and directs the CARB to determine whether a LCFS can be adopted as a discrete early action measure pursuant to AB 32. The CARB approved the LCFS as a discrete early action item with a regulation adopted and implemented in April 2010.

On December 29, 2011, District Judge Lawrence O'Neill in the Eastern District of California issued a preliminary injunction blocking CARB from implementing LCFS. The court found that LCFS impermissibly discriminates against out-of-state corn ethanol and impermissibly regulates beyond California in violation of the dormant Commerce Clause doctrine. As a result of this injunction, LCFS were not incorporated into the analysis provided in this report.

Senate Bill 97 – CEQA: Greenhouse Gas Emissions

In August 2007, Governor Schwarzenegger signed into law SB 97 – CEQA: Greenhouse Gas Emissions, stating: "This bill advances a coordinated policy for reducing GHG emissions by directing the Office of Planning and Research (OPR) and the Resources Agency to develop California Environmental Quality Act (CEQA) guidelines on how state and local agencies should analyze and, when necessary, mitigate GHG emissions." Specifically, SB 97 requires the OPR to prepare, develop, and transmit to the California Natural Resources Agency (CNRA) guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, as required by CEQA, including but not limited to, effects associated with transportation or energy consumption. The CNRA certified and adopted the guidelines amendments on December 30, 2009, and transmitted

the Adopted Amendments and the entire rulemaking file to the OAL on December 31, 2009. The amendments were approved by the OAL on February 16, 2010, and became effective on March 18, 2010. The new State CEQA guidelines provide the lead agency with broad discretion in determining what methodology is used in assessing the impacts of GHG emissions in the context of a particular project.

With respect to the significance assessment, newly added State CEQA Guidelines Section 15064.4, subdivision (b), indicates:

> A lead agency should consider the following factors, among others, when assessing the significance of impacts from GHG emissions on the environment:
>
> (1) The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting;
> (2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project;
> (3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

The amendments also provide that lead agencies should consider all feasible means of mitigating GHG emissions that substantially reduce energy consumption. These potential mitigation measures may include carbon sequestration. If off-site or carbon-offset mitigation measures are proposed, they must be part of reasonable plan of mitigation that the agency itself is committed to implementing. No threshold of significance or any specific mitigation measures are indicated.

Among other things, CNRA noted in its Public Notice for these changes that impacts of GHG emissions should be considered in the context of a cumulative impact, rather than a project impact. The Public Notice states:

> "While the Proposed Amendments do not foreclose the possibility that a single project may result in greenhouse gas emissions with a direct impact on the environment, the

> evidence before [CNRA] indicates that in most cases, the impact will be cumulative. Therefore, the Proposed Amendments emphasize that the analysis of greenhouse gas emissions should center on whether a project's incremental contribution of greenhouse gas emissions is cumulatively considerable."

Senate Bill 375

SB 375 was signed and passed into law on September 30, 2008. SB 375 enhances the CARB's ability to reach AB 32 goals. Specifically, SB 375 requires the CARB to set regional targets for the purpose of reducing GHG emissions from passenger vehicles for the years 2020 and 2035. If regions develop integrated land use, housing and transportation plans that meet the SB 375 targets, new projects in these regions can be relieved of certain review requirements of CEQA. The targets apply to the regions in the state covered by 18 metropolitan planning organizations (MPOs).

Per SB 375, the CARB appointed a Regional Targets Advisory Committee (RTAC) on January 23, 2009, to provide recommendations on factors to be considered and methodologies to be used in the CARB's target-setting process. The RTAC provided its recommendations in a report to the CARB on September 29, 2009. The CARB released its draft targets on June 30, 2010, and adopted their final targets on September 23, 2010.

The SANDAG developed its first Regional Transportation Plan (RTP) subject to the provisions of SB 375, which requires that MPOs prepare a Sustainable Communities Strategy (SCS) as part of the RTP. The SCS must demonstrate how development patterns and the transportation network, policies, and programs can work together to achieve the GHG emission reduction targets for cars and light trucks that will be established by the CARB, if there is a feasible way to do so. The SANDAG Board of Directors released the Draft 2050 RTP and its SCS for public review and comment at its April 22, 2011, meeting. The release of the Draft 2050 RTP began the public comment period which extended through June 30, 2011. The Draft 2050 RTP and its SCS were developed following more than two years of planning, technical development, outreach, and public input. The 2050 RTP was approved by the SANDAG Board of Directors on October 28, 2011.

California Energy Commission: New Solar Homes Partnership

The New Solar Homes Partnership is a component of the California Solar Initiative and has a goal to produce 400 megawatts of solar electricity on approximately 160,000 homes by year 2017. To qualify for the program, a new home must achieve energy-efficiency levels greater than the requirements of the year 2005 Building Title 24 Standards. The builder can choose to

comply with either of two tiers of energy-efficiency measures: Tier I requires a 15 percent reduction from Title 24 Standards; or Tier II, which requires a 35 percent reduction overall and 40 percent reduction in the building's space cooling (air conditioning) energy compared to Title 24 (CEC 2008). In addition, all appliances must have an Energy Star rating, which indicates that the appliance is consistent with the international standard for energy-efficient consumer products.

California Air Resources Board: Interim Significance Thresholds

In October 2008, the CARB released interim guidance on significance thresholds for industrial, commercial, and residential projects (CARB 2008b, CARB 2011). The draft proposal for residential and commercial projects states that a project would not be significant if it complies with a previously approved plan that addresses GHG emissions, or meets an energy use performance standard defined as CEC's Tier II Energy Efficiency goal (specified as 35 percent above Title 24 requirements) along with "as yet to be defined" performance standards for water, waste, and transportation or is below an "as yet to be developed" threshold for GHG emissions tons per year. As such, the CARB did not establish a threshold of significance. As of January 22, 2009, the CARB has halted all work efforts on the draft *GHG Threshold of Significance under CEQA*.

California Air Resources Board: Scoping Plan

On December 11, 2008, the CARB adopted the Scoping Plan as directed by AB 32 (CARB 2008b). The Scoping Plan proposes a set of actions designed to reduce overall GHG emissions in California to the levels required by AB 32. In August 2011, Scoping Plan was reapproved by CARB (CARB 2011), and the measures in the Scoping Plan are in place as of January 2012. Measures applicable to development projects include the following:

- Maximum energy-efficiency building and appliance standards, including more stringent building codes and appliance efficiency standards, and solar water heating;
- Use of renewable sources for electricity generation, such as photovoltaic solar associated with the Million Solar Roofs program;
- Regional transportation targets, including integration of development patterns and the transportation network to reduce vehicle travel, as identified in SB 375; and
- Green Building strategy, including siting near transit or mixed use areas, zero-net-energy buildings, "beyond-code" building efficiency requirements and the use of the CEC's Tier II Energy Efficiency goal.

Relative to transportation, the Scoping Plan includes nine measures or recommended actions. One of these is measure T-3, Regional Transportation-related Greenhouse Gas Targets, which relies on SB 375 implementation to reduce GHG emissions from passenger vehicles through reducing VMT. The other measures are related to vehicle GHGs, fuel and efficiency measures, and would be implemented statewide rather than on a project-by-project basis.

2010 California Green Building Standards Code

The 2010 California Green Building Standards Code, referred to as CALGreen, went into effect in January 2011. CALGreen is the first-in-the-nation statewide mandatory green building code. California now requires new buildings to reduce its water consumption, employ building commissioning to increase building system efficiencies, divert construction waste from landfills, and to install low pollutant-emitting finish materials. CALGreen has approximately 52 mandatory measures and additional measures designed to allow local cities to adopt codes that go beyond the state mandatory provisions. Some key mandatory measures for commercial buildings include specified parking for clean air vehicles, a 20-percent reduction of potable water use within buildings, a 50-percent construction waste diversion from landfills, use of building finish materials that emit low volatile organic compounds, and building commissioning. Other key components include increased reduction in energy usage by 15 percent and increased reduction in potable water use. The CALGreen code includes the critical issue of compliance verification by utilizing the existing building code enforcement infrastructure, and allows local public agencies to incorporate the CALGreen code provisions into their construction field inspections. The mandatory CALGreen measures will be inspected and verified by local building departments.

Existing Greenhouse Gas Levels

The United Nations Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. The IPCC concluded that a stabilization of GHGs at 400 to 450 parts per million (ppm) CO_2e concentration is required to keep global mean warming below 3.6ºF, which is assumed to be necessary to avoid dangerous climate change.

Greenhouse gases have varying global warming potential (GWP). The GWP is the potential of a gas or aerosol to trap heat in the atmosphere, and is defined as the "cumulative radiative forcing effect of a gas over a specified time horizon resulting from the emission of a unit mass of gas

relative to a reference gas." The reference gas for GWP is CO_2; therefore, CO_2 has a GWP of 1. The other main GHGs that have been attributed to human activity include CH_4, which has a GWP of 21, and N_2O, which has a GWP of 310.

Anthropogenic sources of CO_2 include combustion of fossil fuels (coal, oil, natural gas, gasoline and wood). Data from ice cores indicate that CO_2 concentrations remained steady for approximately 10,000 years. Concentrations of CO_2 have increased in the atmosphere since the industrial revolution (i.e., from approximately the year 1750 onward) from approximately 280 ppm to approximately 388 ppm in 2009, an increase of 108 ppm. Data from Mauna Loa Observatory on Hawaii indicate that CO_2 concentrations in the atmosphere have increased from 315 ppm in 1960 to the present levels (ESRL 2010).

Methane is the main component of natural gas and also arises naturally from anaerobic decay of organic matter. Anthropogenic sources of natural gas include landfills, fermentation of manure and cattle farming. Anthropogenic sources of N_2O include combustion of fossil fuels and industrial processes such as nylon production and production of nitric acid.

In 2004, total GHG emissions worldwide were estimated at 20,135 million metric tons of CO_2e emissions (United Nations Framework Convention on Climate Change 2006). The United States contributed the largest portion of GHG emissions at 35 percent of global emissions. In California, according to the CEC, CO_2 accounts for approximately 84 percent of statewide GHG emissions, with CH_4 accounting for approximately 5.7 percent of GHG emissions, and N_2O accounting for 6.8 percent of GHG emissions (CEC 2006b). Other pollutants account for approximately 2.9 percent of GHG emissions in California. The transportation sector is the single largest category of California's GHG emissions, accounting for 41 percent of emissions statewide. The CARB estimates that the 1990 statewide CO_2e emissions level was 427 million metric tons (MMT) (CARB 2007a). In 2004, California produced 492 MMT of total CO_2e emissions.

In addition to the California GHG Inventory, a regional (County-wide) GHG inventory was prepared by the University of San Diego (USD) School of Law Energy Policy Initiative Center (EPIC) in 2008. This San Diego County GHG Inventory is a detailed inventory that takes into account the unique characteristics of the region in calculating emissions. A total of 34.4 MMT CO_2e was generated by the County of San Diego, including both the incorporated and unincorporated areas. Not surprisingly, the largest contributor of GHG was the on-road transportation category, which comprised 46 percent (16 MMT CO_2e) of the total amount. The second-highest contributor was the electricity category, which contributed 9 MMT CO_2e, or 25

percent of the total. Together, the on-road transportation and electricity category comprised 71 percent of the total GHG emissions for the County. The remaining amount was contributed by natural gas consumption, civil aviation, industrial processes, off-road transportation, waste, agriculture, rail, water-borne navigation and other fuels. By 2020, under a "business-as-usual" scenario, regional GHG emissions in San Diego County are expected to be 43 MMT CO_2e, an increase of 14 MMT CO_2e (48 percent) over 1990 levels. "Business as usual" is defined as the emissions that would have occurred in the absence of reductions mandated under AB 32

Current sources of GHG emissions at the existing Westfield Carlsbad shopping center include the combustion of fossil fuels, including emissions from energy use, water consumption and emissions from motor vehicles. Ornamental landscaping at the shopping center has the benefit of storing limited amounts of carbon and would be considered to be a minor carbon sink. Due to its developed nature, extensive vegetation does not exist on site.

4.6.2 Thresholds for Determining Significance

To date, there have been no local, regional, state, or federal regulations establishing a threshold of significance to determine project specific impacts of GHG emissions. The State CEQA Guidelines allow lead agencies to develop a significance threshold. However, the City has not established such threshold. Therefore, the City is utilizing the following as its CEQA threshold of significance. Based on Appendix G of the State CEQA Guidelines, the project would have a significant direct, indirect or cumulative impact to GHG if the project would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

In order to serve as a guide for determining when a project triggers the need for a GHG significance determination, local jurisdictions have established an interim screening threshold for GHG emission analysis based on guidance in the California Air Pollution Control Officers Association (CAPCOA) report "CEQA & Climate Change," dated January 2008. The CAPCOA report utilizes a screening threshold of 900 metric tons of CO_2e as a conservative threshold for requiring further analysis of GHG emissions. Projects with emissions below the 900-metric ton screening threshold would not have the potential to cause significant impacts to global climate change; above the 900-metric ton threshold, a project would be required to evaluate whether emissions can be reduced below "business as usual" levels. For those projects above the

900-metric ton screening threshold, a target GHG reduction of 16 percent below "business as usual" would be required by the City based on project compliance with the California CARB's Scoping Plan and year 2020 "business as usual" forecast model, which represents the GHG emissions that would be expected to occur without any GHG project reducing features or mitigation as mandated under AB 32.

4.6.3 Environmental Impact

The methodologies recommended in the California Climate Action Registry General Reporting Protocol (Protocol) were followed to calculate GHG emissions from the proposed project. Based on the Protocol, GHG reporting includes the following sources:

- Direct emissions from mobile source combustion;
- Direct emissions from stationary combustion;
- Indirect emissions from electricity use;
- Direct process emissions; and
- Direct fugitive emissions.

The relevant emissions include direct emissions from mobile sources and indirect emissions from electricity use and other sources. No direct stationary combustion, process or fugitive emissions have been calculated for the proposed project because these sources would be associated with industrial or larger commercial projects.

The Protocol indicates that emissions from operations, facilities and sources should be reported. The Protocol recognizes the concept of management control, and indicates that management control may be defined in either operational or financial terms. Operational control is the authority to develop and carry out the operating or health, safety and environmental policies of an operation or at a facility. Financial control is the ability to dictate or direct the financial policies of the entity. For the purposes of this analysis, management control of the proposed project is assumed to encompass the development of the project and options for construction and operation of the project.

The equation below provides the basic calculation required to determine CO_2e from the total mass of a given GHG using the GWPs published by the IPCC.

$$\text{Metric Tons of } CO_2e = \text{Metric Tons of GHG} \times \text{GWP}$$

This method was used to evaluate GHG emissions during construction and operation of the proposed project. For this analysis, only CO_2, CH_4, and N_2O are considered due to the relatively large contribution of these gases in comparison to other GHGs produced during the project construction and operation phase.

The GHG emission estimates were calculated using CalEEMod. CalEEMod, which stands for "California Emission Estimator Model," is an air quality modeling program that estimates air pollution emissions in pounds per day (lbs/day) or metric tons per year (mtpy) for various land uses, area sources, construction projects, and project operations. Mitigation measures can also be specified to analyze the effects of mitigation on project emissions. The CalEEMod model uses the CARB EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions. CalEEMod includes CO_2, N_2O, and CH_4 emissions factors, the principal GHG constituent.

As noted above, GHG emissions are classified as direct and indirect. Direct emissions are associated with the production of GHG at the site. These would include the combustion of natural gas in heaters or stoves, the combustion of fuel in engines or construction vehicles, and fugitive emissions from valves and connections, which include CH_4 as a component. Indirect emissions include the emissions from vehicles (both gasoline and diesel) delivering materials and equipment to the project site or the use of electricity. Electricity produces GHG emissions because of the common use of fossil fuels for the generation of electricity, especially in Southern California. Indirect GHG emissions are also associated with water use, as electricity is required to pump and treat water that would be used at the proposed project. Case studies documented by the EPA demonstrate that water treatment plants, in combination with the California electricity usage and GHG emission rate, generate up to 1.2 tons of CO_2 per million gallons of water used, due to electricity use. Indirect GHG emission associated with trash services, and other services that might visit the project site are also accounted for in the CalEEMod calculations, which incorporate the vehicle travel of diesel trucks that would visit and service the proposed project.

Construction Greenhouse Gas Emissions

Construction GHG emissions associated with the development of up to approximately 35,417 square feet (sf) of net new gross leasable area (GLA) were calculated for the three GHGs of primary concern (CO_2, CH_4, and N_2O) that would be emitted during project construction. In addition to the net 35,417 sf of development, the proposed project also includes the renovation of 225,631 sf of the mall. All renovation work would include the upgrade of the building energy efficiency and water conservation in accordance with the latest Title 24 and

CALGreen building codes implemented during year 2013 (i.e., the year of expected construction start date).

GHG emissions would be associated with the construction phase of the proposed SDP through use of heavy equipment and vehicle trips. Construction-related emissions of GHGs would be temporary. Similar to the criteria pollutants analysis contained in Section 4.2 of this EIR, the following construction analysis assumes the former Robinsons-May department store would be renovated (rather than demolished entirely). As shown in Table 4.6-1, *Summary of Total Construction Greenhouse Gas Emissions*, based on emission estimates from the CalEEMod model for heavy construction equipment and vehicle trips, total GHGs associated with construction are estimated at 3,545.74 metric tons of CO_2 total for the duration of construction.

Table 4.6-1
SUMMARY OF TOTAL CONSTRUCTION GREENHOUSE GAS EMISSIONS

Calendar Year	CO_2	CH_4	N_2O	CO_2e
2013	2,155.22	0.27	0.00	2,160.83
2014	1,381.32	0.17	0.00	1,384.91
TOTAL (metric tons)	**--**	**--**	**--**	**3,545.74**
Amortized over 30 years (metric tons)				**118.19**

Source: HELIX 2012a

The construction phase of the project is short-term and temporary, with no long-term potential to emit annual GHG pollutants from construction-related sources. For construction phase project emissions, GHGs are quantified and amortized over the life of the project. To amortize the emissions over the life of the project, the SCAQMD guidelines recommend calculating the total greenhouse gas emissions for the construction activities, dividing it by the project life (i.e., 30 years for commercial projects). Amortized over 30 years, construction equipment would contribute 118.19 metric tons per year of CO_2e emissions to the project's total. As such, construction of the current SDP proposal would have a less than significant impact on regional, state, national and global GHG emissions.

Operational Greenhouse Gas Emissions

Operation of the proposed SDP would result in GHG emissions from vehicular traffic generated by patrons/employees, area sources (landscape maintenance), energy consumption (natural gas appliances and electrical generation), solid waste generation, and water supply. With respect to

the proposed SDP operational phase, direct GHG emissions would be associated with natural gas combustion (furnace and water heaters), use of other fuel-consuming equipment (lawn care equipment), etc. Indirect emissions would be associated with electrical generation, water consumption and vehicle trips.

Energy Use

Emissions associated with energy use would arise from the combustion of fossil fuels to provide energy for the regional shopping center. The current SDP proposal is assumed to use purchased electricity for cooling, appliances and plug-loads, and natural gas for cooking and water heating. Emissions of GHGs from the shopping center expansion and redevelopment were projected based on estimated annual energy use.

The proposed project would be constructed in accordance with the current 2008 Title 24. As discussed above, the current Title 24 2008 includes standards to achieve a minimum 15 percent greater energy efficiency than Title 24 2005. Because the computer model uses energy consumption data applicable to approximately year 2005, the energy emission rates were reduced by 15 percent to account for the increased energy efficiency standards now present in the 2008 Title 24. It should be noted that electricity emissions in CalEEMod were reduced by 15 percent to account for the adopted Renewable Energy Portfolio Standard (RPS), and adjusted baseline energy efficiency standards (i.e., from 2005 to 2008), consistent with the CARB 2011 Scoping Plan projections.

Additionally, the project would comply with the proposed 2012 CALGreen Code's energy efficiency rates of 20-percent improvements (including up to 40-percent improvements with the indoor and outdoor lightning technology) for the entire 225,631 sf of the mall renovation and the net 35,417 sf new development (i.e., total 261,048 sf). By exceeding the current 2008 Title 24 energy efficiency standards by 20 percent, the proposed project would reduce natural gas GHG emissions by 20 percent. Implementation of these regulatory requirements as part of the project design would result in a reduction in existing GHG emissions related to energy sources of 167.99 metric tons annually for the proposed project. These GHG emission reduction credits were taken for the entire 261,048-sf project since both the new construction and renovated space would be required to comply with the regulations as part of the project design and City of Carlsbad requirements. Thus, the proposed project estimates assume the current 2008 energy efficiency standards plus the 2012 CALGreen Building standards for the associated 225,631-sf energy demand rates.

Water Consumption

Water use and energy use are often closely linked. The provision of potable water to commercial and residential consumers requires large amounts of energy associated with five stages: (1) source and conveyance, (2) treatment, (3) distribution, (4) end use and (5) wastewater treatment. The current proposal of a 35,417-sf net expansion would increase the existing potable water demand for the site by 5.66 gpm (over existing conditions), requiring an additional 8,145 gallons per day, or 2,972,925 gallons per year,

Since the proposed project would be constructed in accordance with the 2008 Title 24, the projected water emissions were adjusted to account for the recent CALGreen mandate to reduce water consumption by 20 percent. The CALGreen mandate for water conservation includes the installation of low-flow bathroom faucet (32% reduction in flow), low-flow kitchen faucet (18% reduction in flow), low-flow toilet (20% reduction in flow), low-flow shower (20% reduction in flow), and use water-efficient irrigation systems (6.1% reduction in flow). Based on the CalEEMod analysis for the proposed project, emissions of CO_2e water use were estimated at 17.56 metric tons per year.

Vehicle Use

Mobile-source GHG emissions were estimated based on the projected ADTs from the Transportation Study (Gibson 2012). Based on the maximum of approximately 1,240 ADT projected for the proposed SDP, emissions of CO_2e vehicle GHGs were estimated at 867.02 metric tons per year.

Solid Waste Generation

The proposed project would generate solid waste, and would therefore result in CO_2e emissions associated with landfill offgasing. Based on the CalEEMod analysis for the proposed project, emissions of CO_2e solid waste generation were estimated at 8.46 metric tons per year.

Total Operational GHG Emissions

As shown in Table 4.6-2, *Summary of Estimated Net Operational Greenhouse Gas Emissions*, project-related operational GHG emissions would be 843.24 metric tons of CO_2e emissions per year, thus producing less GHG emissions than the screening threshold of 900 metric tons per year. Therefore, the operational GHG impacts associated with the proposed SDP would be less

than significant and the project would not conflict with the California CARB's Scoping Plan and year 2020 "business as usual" forecast model. No GHG reduction measures would be required; however, the project would feature a number of sustainable design features that would minimize emissions of GHG (as described in Section 3.0 of this report).

Table 4.6-2
SUMMARY OF ESTIMATED NET OPERATIONAL GREENHOUSE GAS EMISSIONS

Emission Source	Annual Net Emissions (metric tons/year)			
	Carbon Dioxide (CO_2)	Methane (CH_4)	Nitrous Oxide (N_2O)	CO_2 Equivalents (CO_2e)
Amortized Construction	--	--	--	118.19
Area	0.00	0.00	0.00	0.00
Energy	-167.10	-0.01	0.00	-167.99
Mobile	866.17	0.04	0.00	867.02
Waste	3.77	0.22	0.00	8.46
Water	15.64	0.06	0.00	17.56
TOTAL CO_2 Equivalent Emissions				**843.24**
GHG Screening Threshold				**900.00**
Below Threshold?				**Yes**

Source: HELIX 2012a

4.6.4 Mitigation Measures

No significant project-level GHG emissions impacts have been identified; therefore, no mitigation measures are proposed.

4.6.5 Level of Significance after Mitigation

No mitigation is required; impacts would be less than significant.

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